Backyard & Worm Composting

UC Master Gardeners of Napa County

In partnership with
City of Napa & Napa County

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CITY OF NAPA

Upper Valley Agency
WASTE MANAGEMENT

Master Gardener
UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

NAPA COUNTY CALIFORNIA

A Tradition of Stewardship
A Commitment to Service

UC Master Gardeners of Napa County

http://napamg.ucanr.edu/

Our mission: "To extend research-based knowledge and information on home horticulture, pest management, and sustainable landscape practices to the residents of California and be guided by our core values and strategic initiatives."

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Definition of Composting

Process in which organic substances are reduced from large volumes of rapidly decomposable materials to small volumes of materials which continue to decompose slowly.

The Many Benefits of Compost

- Reduces landfill waste. Approximately 30% of what we send to landfill is organic materials.
- Compost improves soil structure:
  - Improves water penetration in heavy soils
  - Improves water & nutrient retention in all soils
  - Improves drainage and aeration in all soils
  - Nurtures and feeds soil organisms
  - Slowly releases nutrients & minerals that plants use
  - Conserves soil moisture

Uses for Compost

- Compost is considered a soil conditioner.
- It improves the tilth
  - It is NOT a fertilizer
  - Compost feeds the soil, not the plant
  - Fertilizer feeds the plant, not the soil
- Can be used as a:
  - Soil amendment
  - Mulch
  - Potting mix

The Biology of Composting

- Decomposers consist of micro- and macro-organisms.
- The activity of these organisms create heat which, up to a point, speeds up the process.
  - Too hot kills decomposers
- Complete decomposition results in a humus-like substance called compost.

What does compost need?

- Decomposers
- Water
- Air
- Food

Decomposers

- Macro-organisms: worms, sowbugs, etc.
- Microorganisms: bacteria, fungi, actinomycetes

Macroorganisms

- ✓ Physical decomposers – chew or tear matter
- ✓ Some considered pests
- ✓ Work in pile while it is cool
- ✓ E.g. : ants, centipedes, sowbugs, springtails, flies, snails, slugs, beetles, earthworms

Microorganisms

- Most important of the decomposers
- 3 types of aerobic bacteria (psychrophiles, mesophiles, thermophiles)
- Each thrive under certain temperatures & moisture levels
- Nutritionally diverse – eat most anything
- Can reproduce at a rapid rate
- Use carbon for energy and nitrogen to build protein in their bodies
- Oxidation of organic matter heats up compost pile

Bacteria

- Psycrophiles
  - First to go to work
  - Thrive at 55°F
  - Give off small amount of heat
- Mesophiles
  - Produce CO_2 & heat
  - Thrive at 70°F – 90°F
  - Does most of the work in cool and warm method compost piles
- Thermophiles
  - Work horses
  - Thrive at 140°F – 200°F
  - Work fast for 3-5 days.
  - Change organic material to uniform deep brown color

The Stabilization Phase

- Fungi
  - Saprophitic fungi obtain energy from and help decompose dead/decaying matter
- Actinomycetes – part bacteria, part fungi
  - Produce grayish, cobwebby substance
  - Responsible for earthy smell to compost
  - Frees carbon and nitrogen for plant use

Food

- Organic material
- Carbon rich material or “browns”
  - are usually dry
  - Dried garden debris
    - Dried leaves, dried grass clippings, prunings, bark chips
  - Paper and cardboard
  - Straw
  - Rice hulls

Food continued

- Nitrogen rich materials “greens”
  - Green leaves
  - Kitchen waste (vegetables and fruits)
  - Green grass clippings
  - Coffee grounds
  - Tea bags or tea leaves
  - Fresh garden debris
  - Fresh or aged herbivore manure

Chop size?

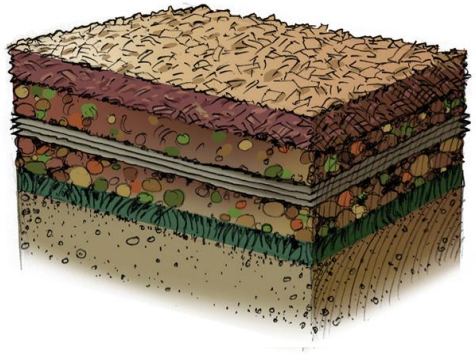
What Not to Add to Compost Pile

- Meat or fish products
- Dairy products
- Fats or oils
- Soil
- Wood ashes
- Weed seeds
- Meat eating animal manure

Commercial

Methods of Composting

- Worm composting (vermicomposting)
- Lasagna or sheet composting



- Cool or no fuss composting
- Warm composting (hybrid and most popular)
- Rapid or hot composting

Worm Composting

Worm Composting

Composting with worms (also called vermicomposting) is usually done with the common red wiggler worm (Eisenia fetida).

This worm's specialized digestive system converts food waste and other organic materials to a nutrient-rich compost called vermicast or worm castings.

It thrives in an aerobic (with air) environment. It is able to process large amounts of food waste and rapidly reproduce in a confined space.

Lasagna or Sheet Composting

- Ideal for conditioning large areas of uncultivated soil for future planting
- Wet soil first and moisten each layer applied
- Cover ground with alternating layers of newspaper and/or cardboard, grass clippings, leaves, etc.
- Plant when materials have decomposed

Lasagna or Sheet Composting

Lasagna or Sheet Composting

Cool or No Fuss Composting

- Compost happens
- 1-2 years to completion
- Continually add organic matter as you get it
- Little to no control or monitoring
- Does not kill seeds or pathogens
- Macrobes and phychrophiles at work

Warm Composting

- More control and monitoring
- May or may not add new organic matter
- Pile will get warm
- Turn pile occasionally
- Macrobes, psychrophiles, mesophiles at work
- 3 months to 1 year to completion
- Will not kill seeds or many pathogens

Rapid or Hot Composting

- UC recommended
- Very controlled and monitored
- Equal volumes of browns and greens to fill bin
- No adding of new organic matter
- Turn every 3-5 days as pile cools
- Kills many pathogens and seeds
- Complete decomposition in 3-8 weeks

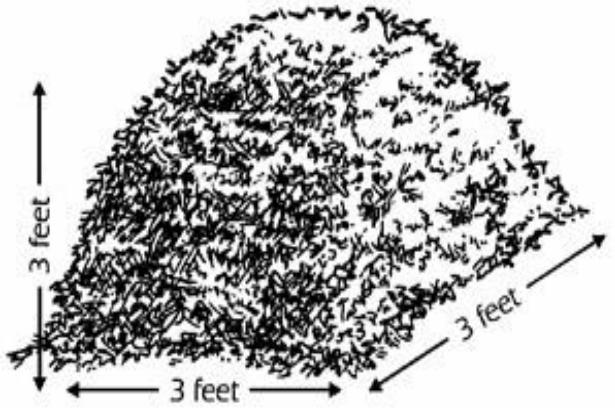
Temperatures that kill soil organisms

- 140°F-145°F: *Fusarium*, most plant pathogenic fungi and bacteria, worms, slugs, centipedes
- 140°F-160°F: soil insects
- 160°F: all plant pathogenic bacteria and most plant viruses
- 160°F-180°F: most weed seeds
- 200°F-212°F: few resistant weed seeds, resistant plant viruses

Oregon/Washington Master Gardener Handbook; page 65

Building the Pile

- 3’x3’x3’ ideal pile
- Particle size ½” to 1 ½“
- Moisture
  - Wrung out sponge
  - Too dry slows process
  - Too wet and anaerobes move in making pile stink and will not generate heat
- Oxygen – turn pile to aerate
- Temperature – at 155°F matter will decompose twice as fast as at 130°F



Tools

- Shovel to remove compost from bin

- Pitchfork to aerate compost pile or to add material to piles

- Chipper/shredder or lawn mower to chop materials

- Weed whacker in a garbage can to chop up materials
- Pruning or lopping shears to chop materials

Tools continued

- Thermometer to monitor temperature

- Compost sifter to remove non-decomposed matter

- Claw to turn pile and/or bury kitchen waste

- Wheelbarrow to move compost

- Types of bins


CORONA
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CORONA

Garden Safety

- Protection equipment:
  - Gloves
  - Long pants
  - Long sleeve shirt
  - Safety glasses
  - Mask over nose and mouth
- Most common methods of pathogen transmission:
  - Ingestion, inhalation, skin trauma


SAN FRANCISCO
Fisherman's Wharf

Bin, Location and Rotation

The best bin system, location and rotation method is the one you will use!!!

Trouble Shooting

- Pile not composting
  - Too dry, lack of oxygen, too much carbon
- Pile smells
  - Too wet, meat/grease added
- Rodents and other animals
  - Meat/grease, food waste not buried, no protection

Upcoming Composting Events

September 16, 2023 **UC Cooperative Extension**	**Saturday** **12 PM to 2 PM**	**Backyard & Worm Composting Workshop**

Questions?

Link to Composting at City's Facility: https://vimeo.com/265792300

Resources

- Compost in a Hurry (PDF) - essential steps for creating finished compost in as little as 2 to 3 weeks. (ANR pub #8037)
  English- https://anrcatalog.ucanr.edu/pdf/8037.pdf

  Spanish- https://anrcatalog.ucanr.edu/pdf/8367s.pdf
- Rapid Compost Method: https://vric.ucdavis.edu/pdf/compost_rapidcompost.pdf
- California Master Gardener Tip Sheet: Compost is Good for your Garden and the Environment (ANR pub #8367) https://anrcatalog.ucanr.edu/pdf/8367.pdf

Resources con't

- UC Master Gardener Placer County Compost Information: http://pcmg.ucanr.org/Composting_Information/
- Composting for the Home Gardener: http://sacmg.ucanr.edu/files/163139.pdf
- Compost Video Series by UC Master Gardeners of Orange County: http://mgorange.ucanr.edu/Soils-Fertilizers-Compost/Composting-Video-Series-386/
- Compost Tea by Steven Swain, UCCE Advisor in UC IPM Pest of the Urban Landscape blog, April 3, 2014. https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=13471